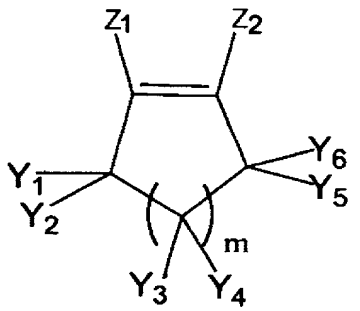
What is claimed is:

1. A photoresist monomer represented by following Formula 1:

Formula 1



wherein Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, Z_1 and Z_2 are individually selected from the group consisting of halogen, an alkyl partially substituted with halogen, and an alkyl wholly substituted with halogen; and

m is an integer ranging from 0 to 2.

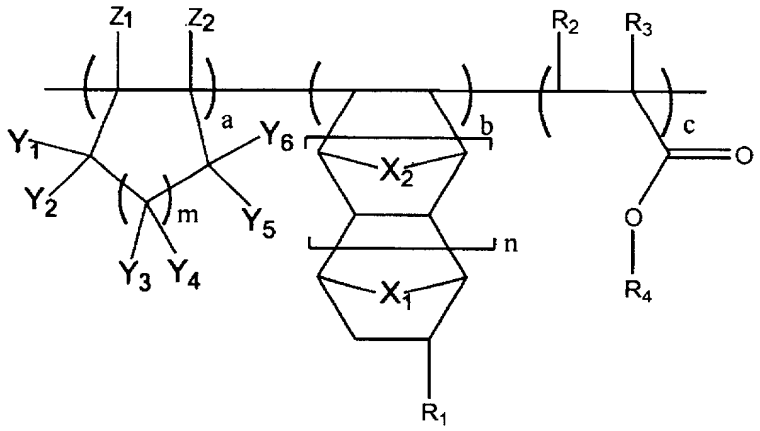
2. The photoresist monomer according to claim 1, wherein the Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, Z_1 and Z_2 are individually selected from the group consisting of F, Cl, Br, I and CF_3.

3. The photoresist monomer according to claim 1, wherein the monomer of Formula 1 is selected from the group consisting of octafluorocyclopentene and hexafluorocyclobutene.

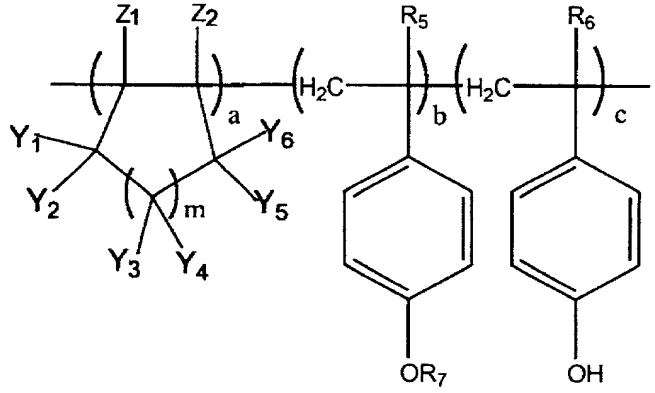
4. A photoresist polymer comprising the photoresist monomer of claim 1.

5. The photoresist polymer according to claim 4, wherein the polymer comprises a repeating unit of Formula 2 or Formula 3.

Formula 2



Formula 3



wherein R_1 is selected from the group consisting of H, halogen, (C_1-C_{20}) alkyl, (C_1-C_{20}) alkyl with at least one halogen substituent, (C_1-C_{20}) alkyl containing at least one of an ether group (-O-) and an ester group, (C_1-C_{20}) alkyl with at least one halogen substituent and containing at least one of an ether group and an ester group, and -COOR';

R_2, R_3, R_5 and R_6 are individually selected from the group consisting of H, halogen, (C_1-C_{20}) alkyl, (C_1-C_{20}) alkyl with at least one halogen substituent, (C_1-C_{20}) alkyl containing at least one of an ether group and an ester group and (C_1-C_{20}) alkyl with at least one halogen

substituent and containing at least of one of an ether group and an ester group;

R', R_4 and R_7 are individually acid labile protecting groups;

X_1 and X_2 are individually selected from the group consisting of (C_1-C_{10}) alkylene, O and S;

Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, Z_1 and Z_2 are individually selected from the group consisting of halogen, an alkyl partially substituted with halogen, and an alkyl wholly substituted with halogen;

m and n are individually integers ranging from 0 to 2; and

the ratio a : b : c falls within the ranges 1-50mol% : 0-90mol% : 0-90mol%.

6. The photoresist polymer according to claim 5, wherein the R_2, R_3, R_5 and R_6 are individually selected from the group consisting of H, F, (C_1-C_{20}) alkyl, (C_1-C_{20}) perfluoroalkyl, (C_1-C_{20}) alkyl containing at least one of an ether group and an ester group, (C_1-C_{20}) perfluoroalkyl containing at least one of an ether group and an ester group, (C_1-C_{20}) alkyl partially substituted with F, and (C_1-C_{20}) alkyl partially substituted with F and containing at least one of an ether group and an ester group.

7. The photoresist polymer according to claim 5, wherein the Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, Z_1 and Z_2 are individually selected from the group consisting of F, Cl, Br, I and CF_3.

8. The photoresist polymer according to claim 5, wherein the acid labile protecting group is selected from the group consisting of 2-methyl 2-adamantyl, 2-ethyl 2-adamantyl, 8-ethyl 8-tricyclodecanyl, tert-butyl, tetrahydropyran-2-yl, 2-methyl tetrahydropyran-2-yl, tetrahydrofuran-2-yl, 2-methyl tetrahydrofuran-2-yl, 1-methoxypropyl, 1-methoxy-1-methylethyl, 1-ethoxypropyl, 1-ethoxy-1-methylethyl, 1-methoxyethyl, 1-ethoxyethyl, tert-butoxyethyl, 1-isobutoxyethyl and 2-acetylmenth-1-yl.

9. The photoresist polymer according to claim 5, wherein the repeating unit of Formula 2 is selected from the group consisting of poly(hexafluorocyclobutene/2-methyl 2-adamantyl 5-norbornene-2-carboxylate), poly(octafluorocyclopentene/8-ethyl 8-tricyclodecanyl 5-norbornene-2-carboxylate) and poly(octafluorocyclopentene/2-methyl 2-adamantyl 5-norbornene-2-carboxylate/2-ethyl 2-adamantyl acrylate).

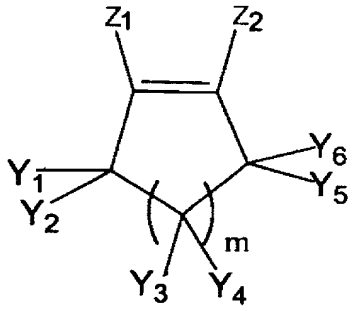
10. The photoresist polymer according to claim 5, wherein the repeating unit of Formula 3 is poly(hexafluorocyclobutene/4-ethoxyethoxy styrene/4-hydroxy styrene).

11. A process for preparing a photoresist polymer comprising:

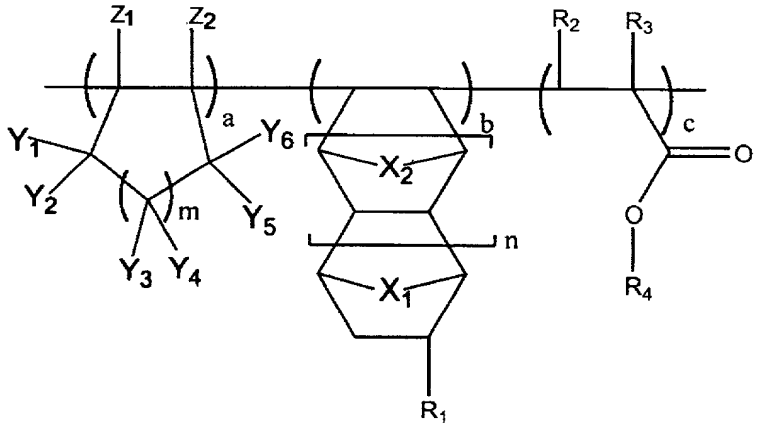
(a) admixing (i) a monomer of Formula 1 and optionally (ii) at least one monomer selected from the group consisting of Formula 4 and Formula 5 to provide a mixture; and

(b) adding a radical polymerization initiator or an anion polymerization catalyst into the mixture of step (a) to obtain a repeating unit of Formula 2,

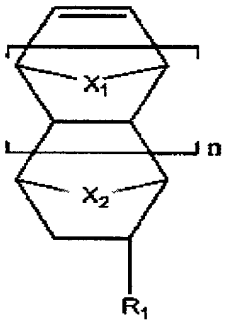
Formula 1



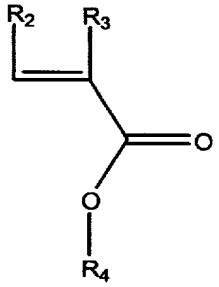
Formula 2



Formula 4



Formula 5



wherein R_1 is selected from the group consisting of H, halogen, (C_1-C_{20}) alkyl, (C_1-C_{20}) alkyl with at least one halogen substituent, (C_1-C_{20}) alkyl containing at least one of an ether group and an ester group, (C_1-C_{20}) alkyl with at least one halogen substituent and containing at least one of an ether group and an ester group, and -COOR';

R_2 and R_3 are individually selected from the group consisting of H, halogen, (C_1-C_{20}) alkyl, (C_1-C_{20}) alkyl with at least one halogen substituent, (C_1-C_{20}) alkyl containing at least one of an ether group and an ester group, and (C_1-C_{20}) alkyl with at least one halogen substituent and containing at least one of an ether group and an ester group;

R'and R_4 are individually acid labile protecting groups;

X_1 and X_2 are individually selected from the group consisting of (C_1-C_{10})alkylene, O and S;

Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, Z_1 and Z_2 are individually selected from the group consisting of halogen, an alkyl partially substituted with halogen, and an alkyl wholly substituted with halogen;

m and n are individually integers ranging from 0 to 2; and

the ratio a : b : c falls within the ranges 1-50mol% : 0-90mol% : 0-90mol%.

12. The process according to claim 11, wherein the step (b) is carried out in a polymerization solvent selected from the group consisting of cyclohexanone, cyclopentanone, tetrahydrofuran, dimethylformamide, dimethylsulfoxide, dioxane, methylethylketone, benzene, toluene, xylene and mixtures thereof.

13. The process according to claim 11, wherein the radical polymerization initiator is selected from the group consisting of 2,2'-azobisisobutyronitrile(AIBN), benzoylperoxide, acetylperoxide, laurylperoxide, tert-butylperoxide and di-tert-butyl peroxide.

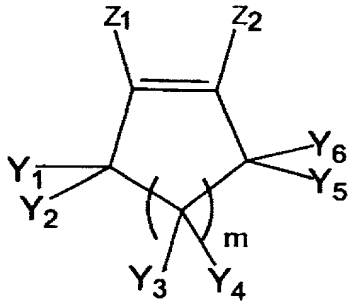
14. The process according to claim 11, wherein the anion polymerization catalyst is selected from the group consisting of KOH, $NaNH_2$, alkoxide ion, alkali metal, Grignard reagent and alkyl lithium.

15. A process for preparing a photoresist polymer comprising:

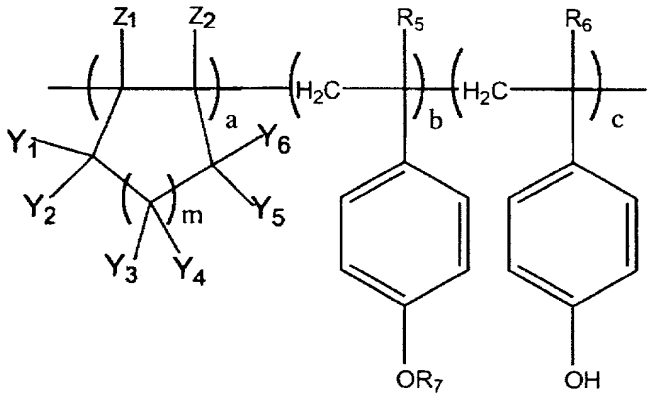
(a) admixing (i) a monomer of Formula 1 and optionally (ii) at least one monomer selected from the group consisting of Formula 6 and Formula 7 to provide a mixture; and

(b) adding a radical polymerization initiator or an anion polymerization catalyst into the mixture of step (a) to obtain a repeating unit of Formula 3.

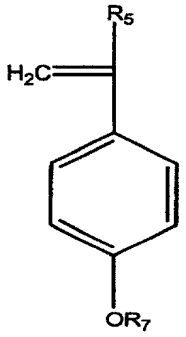
Formula 1



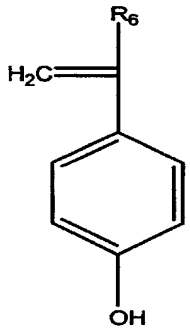
Formula 3



Formula 6



Formula 7



wherein R_5 and R_6 are individually selected from the group consisting of H, halogen, (C_1-C_{20}) alkyl, (C_1-C_{20}) alkyl with at least one halogen substituent, (C_1-C_{20}) alkyl containing at least one of an ether group and an ester group, and (C_1-C_{20}) alkyl with at least one halogen substituent and containing at least one of an ether group and an ester group;

R_7 is an acid labile protecting group;

Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, Z_1 and Z_2 are individually selected from the group consisting of halogen, an alkyl partially substituted with halogen, and an alkyl wholly substituted with halogen;

m and n are individually integers ranging from 0 to 2; and

the ratio a : b : c falls within the ranges 1-50mol% : 0-90mol% : 0-90mol%.

16. The process according to claim 15, wherein the step (b) is carried out in a polymerization solvent selected from the group consisting of cyclohexanone, cyclopentanone, tetrahydrofuran, dimethylformamide, dimethylsulfoxide, dioxane, methylethylketone, benzene, toluene, xylene and mixtures thereof.

17. The process according to claim 15, wherein the radical polymerization initiator is selected from the group consisting of 2,2'-azobisisobutyronitrile(AIBN), benzoylperoxide, acetylperoxide, laurylperoxide, tert-butylperoxide and di-tert-butyl peroxide.

18. The process according to claim 15, wherein the anion polymerization catalyst is selected from the group consisting of KOH, $NaNH_2$, alkoxide ion, alkali metal, Grignard reagent and alkyl lithium.

19. A photoresist composition comprising:

(i) the photoresist polymer of claim 4;

(ii) an organic solvent; and

(iii) a photoacid generator.

20. The photoresist composition according to claim 19, wherein the photoacid generator is selected from the group consisting of phthalimidotrifluoromethane sulfonate, dinitrobenzyltosylate, n-decyl disulfone and naphthylimido trifluoromethane sulfonate.

21. The photoresist composition according to claim 20, wherein the photoacid generator further comprises a compound selected from the group consisting of diphenyl iodide hexafluorophosphate, diphenyl iodide hexafluoroarsenate, diphenyl iodide hexafluoroantimonate, diphenyl p-methoxyphenylsulfonium triflate, diphenyl p-toluenylsulfonium triflate, diphenyl p-isobutylphenylsulfonium triflate, diphenyl p-tert-butylphenylsulfonium triflate, triphenylsulfonium hexafluororphosphate, triphenylsulfonium hexafluoroarsenate, triphenylsulfonium hexafluoroantimonate, triphenylsulfonium triflate, dibutylnaphthylsulfonium triflate and mixtures thereof.

22. The photoresist composition according to claim 19, wherein the photoacid generator is present in an amount ranging from about 0.05 to about 10% by weight of the photoresist polymer.

23. The photoresist composition according to claim 19, wherein the organic solvent is selected from the group consisting of methyl 3-methoxypropionate, ethyl 3-ethoxypropionate, propylene glycol methyl ether acetate, cyclohexanone, 2-heptanone, ethyl lactate and mixtures thereof.

24. The photoresist composition according to claim 19, wherein the organic solvent is present in an amount ranging from about 500 to about 2000% by weight of the photoresist polymer.

25. A process for forming a photoresist pattern, comprising :

(a) coating a photoresist composition of claim 19 on a substrate to form a photoresist film;

(b) exposing the photoresist film to light; and

(c) developing the exposed photoresist film to obtain a photoresist pattern.

26. The process according to claim 25, further comprising a soft baking step before step (b) and/or a post baking step after step (b).

27. The process according to claim 26, wherein the soft and post baking steps are individually performed at the temperature ranging from about 70 to about 200°C.

28. The process according to claim 25, wherein the source of the light of the step (b) is selected from the group consisting of VUV, ArF, KrF, E-beam, EUV and ion beam.

29. The process according to claim 25, wherein the irradiation energy of the step (b) is in the range from about 1mJ/cm^2 to about 100 mJ/cm^2.

30. The process according to claim 25, wherein the step (c) is performed in an alkaline developing solution.

31. A semiconductor element manufactured by the process of claim 25.